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Selective activation of muscle groups in the feline hindlimb through electrical microstimulation of the ventral lumbo-sacral spinal cord

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Abstract

Selective activation of muscle groups In the feline hindlimb by electrical stimulation of the ventral lumbo-sacral spinal cord was investigated. Spinal cord segments L5 to S1 were mapped using a penetrating tungsten needle electrode. Locations that produced isolated contraction of quadriceps, tibialis anterior or triceps surae/plantaris muscles when stimulated with a current of 40 μA or less, and in which spread of activity to other muscles was not detected after increasing the stimulus to at least twice the threshold level, were defined as belonging to the target muscle's "activation pool." The quadriceps activation pool was found to extend from the beginning of L5 to the middle of L6. The tibialis anterior activation pool extended from the beginning of L6 to the middle of L7, and the triceps surae/plantaris activation pool extended from the caudal end of L6 to the beginning of S1. The three activation pools were located in Rexed motor lamina IX and their spatial organization was found to correspond well with that of the anatomically defined motor pools innervating the same muscles. The spatial and functional segregation of motor pools manifested at the spinal cord level can have direct applications in the areas of functional electrical stimulation and motor control

Index Terms

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Controlled Indexing

bioelectric phenomena neuromuscular stimulation

Non-controlled Indexing

40 muA Rexed motor lamina IX anatomically defined motor pools feline hindlimb functional electrical stimulation functional segregation motor control motor pools spatial segregation muscle groups selective activation spatial organization ventral lumbo-sacral spinal cord

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